

MATTRESS MADE OF LATEX FOAM INCLUDING A STRUCTURE OF SACKED SPRINGS, AND MOLD FOR ITS MANUFACTURING

RELATED APPLICATIONS

[0001] The present application is a continuation-in-part application of parent application Serial No. 10/132,601 filed on April 25, 2002 and entitled MATTRESS MADE OF LATEX FOAM INTEGRATING A STRUCTURE OF SPRINGS SACKED OR HELD IN OTHER SUPPORTING MATERIAL, the entire contents of which are expressly incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This invention relates to an improvement made in resilient mattresses made of a sole piece of molded foamed material incorporating a structure with sacked coil springs. More particularly, the invention refers to mattresses of this type having zones with differentiated load bearing capacity.

BACKGROUND INFORMATION

[0003] As it is well-known, the mattress types present in the market are as follows:

- Mattresses of sole wool material;
- Mattresses with springs and fabric materials;
- Mattresses made of sole polyurethane foam or other artificial foam materials manufactured by crude oil;
- Mattresses made of natural or artificial latex foam material, without other supports made of different materials.

[0004] Each of these materials forming the mattress such as wool, natural and artificial fibers, polyurethane, latex, etc. is mainly used in combination with other components in various percentages and construction forms.

[0005] The main characteristics that an efficient and ergonomic mattress should have, is the capacity of bearing the human body for guaranteeing a correct support of the spinal column during the rest, assuring the comfort necessary for a complete muscular relax, and further avoiding the formation of pressure points on the body, in which the blood can circulate with difficulty owing to excessive compression of tissues.

[0006] Excluding the traditional wool mattress and the ones made of sole latex foam or of polyurethane foam or other foamed materials, the spring mattresses commercially available show the resilient bearing supplied by coil springs made of steel or any other suitable materials, and natural or artificial fibers.

[0007] For getting a more comfortable structure, these mattresses hold in addition a lot of material layers such as layers made of latex foam, polyurethane foam and all these parts are covered with wool, cotton, or other stuffings and then they are closed in a fabric envelope or sack.

[0008] The connection of foam layers to the springs is obtained using a mechanical process, such as application of metallic stitches or by glueing; these operations are expensive as they require a rather long and tedious manual work and that must be made mainly by skilled workers.

[0009] The glueing operation can also reduce the mattress duration as, during the use, the glue tends to loose its adhesive capacity; further, the manual glueing operation can be made in incorrect manner or the glue cannot be applied in uniform way on the pieces belonging to the same production lot or also to the same piece.

[0010] The field of inner spring mattresses includes also a mattress type (see U.S. Patent No. 3,855,653) made of a sole piece of molded foam material, in which a series of coil springs is enclosed in a sole sack or envelope made of fabric surrounded by molded polyurethane foam material.

[0011] The spring mattresses of this type have the drawback that they are deformed rather rapidly by the use, compromising in this manner the duration and comfort. This situation is caused by the mattress springs that are free to move within the fabric envelope and, therefore, are subject to traverses in the inside of the same, causing the mattress to be deformed with sinkings or depressions that change its initial attitude or form, causing its efficiency to be reduced.

[0012] For avoiding the spring movements, mechanical connections may be made among the springs, such as e.g. by clips, metallic spirals, seamings, metallic stitches, etc., but these devices, in addition to reduce the spring resiliency, can cause a complex construction of mattress, increasing its costs.

[0013] Further, the mattress deformation is caused also by lying layers, that is to say the superior and lower rest layer, during its use, tend to slide as plates onto the spring structure, as they are joined with another only by the perimetrical layers of molded material that surrounds the envelope, these layers having a reduced mass and therefore are insufficient to lock in stable position the rest layers. In this manner the mattress, both owing to deformations and wear, is no more efficient and comfortable and can be used only for a limited time period.

SUMMARY OF THE INVENTION

[0014] A first aim of the invention is to make a mattress made of molded foam material provided with inner springs, in which both the springs and the mattress lying layers are not submitted to relative traverses during the use and, therefore, the mattress keeps its efficiency and comfort in the time.

[0015] Another important aim of this invention is to make a mattress of this type having zones with differentiated bearing capacity (ergonomic mattress) that is zones or specific points with differentiated flexibility, suitable for assuring a proper support also in zones or specific points of human body so that the person, during the rest, keeps his normal bending or profile.

[0016] According to the invention, the above mentioned and other aims are obtained with a mattress made of foamed material with inner springs, in which each spring is enclosed in a fabric sack for creating, in the material inside, a plurality of resilient units independent and separated with one another and each one being surrounded by a mass of molded latex foam and each fabric sack being firmly (stably) connected to said molded latex foam.

[0017] By this construction, the resilient units remain locked in the initial assembly position as they are singularly (individually) surrounded by a mass of molded material. Also the two mattress laying layers remain stably in position as they form a sole block with the various

material portions that fill, in a continuous manner, the empty spaces present between a resilient unit and the other one.

[0018] The molded material locking onto the fabric sacks is further guaranteed by the use of latex foam. Using a proper batching air to be introduced in the latex foam during its preparation, it is possible to get a very flexible mixture that can form a solid connection among each sack holding the springs and the molded foam latex and in this manner avoid the removal or detaching of the parts due to mattress flexions and bendings.

[0019] Therefore in absence of movements of springs hold in the inside of sacks and slidings onto rest layers in the resilient units, the parts, during the use, remain stably in initial assembly and molding position, therefore there are avoided the drawbacks of rapid wears and deformations of known mattresses.

[0020] The use of single resilient units is advantageous for all of types of foam mattress with inner springs; however, the solution proposed by the invention is particularly suitable for the case of foam inner spring mattresses having zones with differentiated bearing capacity, that is zones, also of limited area, having each a well-established load bearing characteristic or capacity.

[0021] In this case, it shall be possible to foresee the positioning of single units also in specific mattress zones corresponding to specific parts of human body that they shall support, but using sacked springs having bearing characteristics that depend on the weight of said parts, so that the mattress can support in the more suitable manner the different human body parts in the rest position. In fact, back, legs, shoulders etc. require, for the complete and comfortable person's rest, a differentiated bearing and with different depths receiving the human body into the mattress, this condition being obtained using the single units as by these units it is possible to operate locally.

[0022] The mattress zones bearing the more heavy parts of human body, such as the pelvis, shall have greater load bearing characteristics, that is they shall be made of more rigid springs, while the zones under the lighter parts, such as the knees, shall hold units having lower bearing characteristics, that is they shall hold less rigid springs.

[0023] For getting units with differentiated bearing characteristics, the springs shall be made of any suitable type and materials, and further it shall be changed their number and density per square meter (m²).

[0024] According to a further invention characteristic, for making the mattress with differentiated bearing zones, it shall be also provided a change in the molded material density. For this aim, the mattress shall have, in addition to above mentioned resilient units, internal channels or couples of internal channels with outlets onto the rest surfaces and eventually also in the lateral surfaces, for the aim, precisely, to create in the mattress empty spaces and therefore to change its density. Distribution, position, number, form and dimension of these channels or channel couples shall be naturally suitable to get the bearing capacity required locally in the mattress zone for the integration or replacement of the effect caused by resilient units.

[0025] The wished positioning and the number of resilient units and channels or channel couples in the mattress inside shall be made using the molds suitable for manufacturing (by press-molding) the final handwork having the wished flexibility or deformation characteristics.

[0026] The whole resilient unit assembly is inserted into a mold, preferably made of aluminum, having dimensions lightly higher than the spring- structure dimensions so that a free hollow space remains around this spring structure.

[0027] The mold is closed hermetically by a cover, on which there are provided feeding nozzles, suitably located, that allow to inject the latex foam. The foam can be injected from the cover but also (or solely) from the walls and or also (or solely) from the mold bottom.

[0028] The foam injection causes the filling of all of the hollows spaces over, under and on the sides of the resilient units, but it is not put in contact with springs, as these last ones are closed in sacks made of foam- impermeable material. After injection, it is made the process for forming a molded latex foam using a conventional method.

[0029] Both the inside of the mold cover and the bottom thereof as well as the lateral walls of the bottom support solid pins or projections for creating in the mattress the internal channels or the channel couples related both to the layout of resilient units and the formation of hollow spaces for changing the mattress density. In particular, some couples of these pins have the aim of keeping stable the position of resilient units both during their insertion in the mold and during

the molding operation, and also of creating, after the mold opening, some channel couples in alignment with resilient units, while other pins have, instead, the aim of creating, in the mattress, some channels or channel couples that are not lined up with said resilient units, for the aim of changing the density or cooperating to this change. All of the channels or couples of internal channels, in addition to satisfy the requirements of constructive types and for density aims, assure also the mattress aeration (transpiration).

[0030] The mold can be made of open type or of closed type; in this last case the foam shall be poured into the mold inside while it is opened until its filling and shall be closed only in the following.

[0031] In this manner the resilient units can be inserted after the mold filling or before or during the filling operation.

[0032] The latex foam shall surround the whole structure formed by single separated sacked springs or by rows or groups of sacked springs that are not joined with one another.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] For a better understanding of this invention and for showing how the same can be embodied, the following description shall be now developed with reference, with the sole aim of example, to annexed drawings, in which:

[0034] Figure 1 shows, in schematic perspective view, some springs enclosed in sacks forming the resilient units to be inserted in the mattress inside according to the present invention.

[0035] Figure 2 shows, in schematic transversal section view, a possible mold structure in the mattress molding phase according to the present invention.

[0036] Figure 3 shows, in enlarged scale, a mattress portion with two resilient units, obtained after the molding and the extraction from the mold in Figure 2.

[0037] Figure 4 shows, in schematic perspective view, the mold structure in Figure 2, in open condition, including on the lateral walls, on the bottom and in the cover inside some solid pins or projections for generating in the mattress some internal channels or channel couples.

[0038] Figure 5 shows the natural configuration that must have a mattress with internal springs, while on the top part a person is laid during its rest.

[0039] Figure 6 shows, in schematic perspective view, a possible structure of a mattress having differentiated bearing capacity according to the invention.

[0040] Figure 7 shows the transversal mattress section in Figure 6 on the plane crossing the line A-A.

[0041] Figure 8 shows, in schematic view, a layout of a transversal row of resilient units and channel couples in the mattress.

[0042] Figure 9 is a variant of Figure 8.

DETAILED DESCRIPTION

[0043] Making now reference to Figure 1, it is possible to observe that each coil spring M is enclosed in an envelope or sack EL for forming a resilient unit 13. The material forming the envelope EL is of flexible type, so that it is possible to wind suitably the internal springs, and further it is impermeable to the latex foam so that the internal springs are free and can apply with better efficiency the flexibility action onto the person's body laid on the mattress. As the material it can be used a fabric, no woven fabric, gauze, polyether, polyurethane, polyethylene, paper, jute, hemp, raffia, cotton, etc. The drawing shows the springs M as cylindrical, but they can be of the barrel or biconical type and also have dimensions, number of coils, wire diameter and be made of material suitable according to the practical requirements.

[0044] Figure 2 shows by the reference 1 the mold for manufacturing the mattress and by 2 and 3 its component parts and, precisely, the top part 2 with liftable cover 5 and the lower part 3 with bottom 4. Further, there are indicated, by 9 and 10, the nozzles used for introducing into the mold the latex foam and that can be foreseen on the cover 5, on the bottom 4 and on the lateral mold walls as shown, or solely on one or some of these parts.

[0045] The reference 8 shows some cylindrical solid elements, such as pins, that are inserted into the lateral mold walls for protruding into its inside during the introduction phase and vulcanization of latex foam while they are extracted from the mold before opening the cover 5

and extracting the finished mattress. For the insertion of these pins into the mold, the lateral walls are foreseen with holes 8'.

[0046] The bottom 4 and the internal cover side 5 include some solid pins or projections 11 for forming couples of pins having the double function to support, with rest on the external faces 12, the resilient units 13 during their assembly in the mold and, in the following, to keep them in the assembly position during the vulcanization phase of the latex foam.

[0047] As it can be noticed, the units 13 are assembled among said couples of pins 11, perpendicularly to the laying surface 14 and 15 of the mattress in which they open; the units are further put in rows and are independent and separated with one another.

[0048] The cover 5 and the bottom 4 hold also further solid pins, as the pin 16, also these with outlet holes on the surfaces 14 and 15 and that are lined up with one another for forming couples, but are not lined up to the units 13, and having another function as described in the following.

After having extracted the pins 8 and after having opened the mold, said pins 8, 11 and 16 shall create into the mattress some channels or couples of internal channels with the following functions: the blind channels formed by pins 8, shown by 8a in Figure 7, parallel to surfaces 14 and 15, and the channel couples, shown by 11a in Figure 3, in alignment with the units 13 and closed in the inside by the same units, shall mainly supply the aeration or transpiration function to the mattress, while the channel couples, also blind, indicated by 16a in Figure 7, shall have the function to change the material density and also to assure the aeration. The number and layout of the pins 8 or couples of pins 11 and 16 shall vary in relation to flexibility or deformation characteristics required to the mattress and its aeration.

[0049] As it is more clear in Figure 3, the molded latex foam 17 forming the mattress MT surrounds completely each single resilient unit 13 and therefore owing to molded material mass present both between a unit and the other one and between the mattress lying surfaces 14, 15 and said units 13, these last ones, during the mattress use, remain stably (firmly) locked in the initial assembly position and then they are not subject to traverses (movements) and, similarly, the molded material layers located in zone 17a between the lying planes 14 and 15 and the faces 12

of the resilient units are not subject to slidings. So there are avoided the drawbacks of material wears and deformations that are caused in the known mattresses of this type.

[0050] Figure 4 shows the open mold, showing, for drawing simplicity sake, only some pins 11 and two units 13 mounted thereon, a feeding nozzle 9 of latex foam and the pins 8 extracted from the mold inside but still engaged with holes 8'. The bottom 4 holds also a removable division wall 22, preferably made of aluminum, that shall be present in case of manufacturing of mattresses for a single bed, while it shall be removed for manufacturing mattresses for double bed.

[0051] For understanding the advantages arising from the use of the resilient units 13 in the manufacture of mattresses with load bearing capacity, that is to say having zones in which the load bearing capacity is established according to the weight of the human body portion that is laid on it, it is made now reference to Figure 5.

[0052] This figure shows by PE the person in laid supine position on the mattress MT and the arrows A1, B1 show the deformation actions that are applied on the mattress when it is subject to the weight of various parts of human body. Further it is shown the mattress, with the sole aim of example, divided in seven zones, as indicated in the following: Z1: heel zone; Z2: calf zone; Z3: knee zone; Z4: pelvis zone; Z5: lumbar zone (lordosis); Z6: shoulder zone (kyphosis) and Z7: head zone.

[0053] Each one of these zones shall have a load bearing capacity suitable for the specific weight to be supported so that it is guaranteed that the spine of the person laid on the mattress keeps its natural profile or curvature.

[0054] In detail, the central zone Z4 that bears the heavier part (pelvis) corresponding to the body barycenter, shall have a plurality of resilient units with more rigid springs that guarantee a higher bearing capacity while the other zones shall include the unit springs that are less rigid for obtaining a minimum load bearing capacity in the knee zone Z3.

[0055] The distribution of resilient units shall be obtained in the moment of their introduction into the pre-arranged mold, i.e. in the moment of their laying onto the pins 11. The units shall be able to be laid in position both singularly or in groups or also in the form of parallel rows and, for obtaining the right load bearing capacity, the springs shall have

characteristics suitable for the zone and i. e. established forms (cylindrical, barrel or biconical forms), dimensions (width and height), coil number, wire diameter, material type, density per square meter, etc. In any case, the resilient units are separated with one another. Correspondingly between a zone and another one, it shall be changed the distribution and dimensions of bearing pins 11 on the bottom 4 and cover 5.

[0056] Figure 6 shows a mattress MT having five transversely arranged zones or bands F1, F2, F3, F4 and F5 with differentiated load bearing capacity or with different deformability (elastic deformation).

[0057] Regarding the holes represented schematically (in generic manner) on the lying surface 15 and on the opposed surface 14 (these last holes are not shown) of this Figure, some of these holes correspond to the outlets of the internal channels aligned with the resilient units 13 and produced by the solid pins as 11 (see Figures 2 and 4) while other holes correspond to the outlets of the internal channels not aligned with said units and produced the by solid pins as 16 (see Figure 2).

[0058] An important contribution to the mattress manufacturing having differentiated load bearing capacity shall be obtained, according to a further invention aspect, changing the material density i. e. generating in the mattress inside, in combination with the resilient units, some free (empty) spaces in the form of channels or couples of blind channels 16a, these last ones being shown in the Figures 7, 8, and 9.

[0059] Figure 7 shows these channel couples that are foreseen only in the lateral ends of mattress MT and are not aligned with units 13; but in practice, they shall be foreseen in different positions, as shown in Figure 8, where each channel couple 16a is alternated to unit 13, or as shown in Figure 9, where the alternating layout occurs between a group of units 13 and couple group of blind channels 16a. It must be noticed that the blind channels 16a could be foreseen as sole in some mattress zones, for changing its flexibility or deformability.

[0060] What said above shows clearly the advantages that arise from the use of resilient units according to the invention in the manufacturing of mattresses with differentiated load bearing capacity. In fact, it shall be possible, as they are available as free (untied) elements and then not anchored physically to other units, to position the same resilient units, as single elements or in

combination with blind channel couples 16a, in specific mattress points (locations) and in any case to adjust their distribution for allowing the same mattress has the wished local load bearing capacity and then the configuration or bending ideal for the person rest, as shown in Figure 5.